**Remarks**

Summary of Office Action

Claims 13-17 and 30-36 are pending.

Claims 13-17 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, with reference to claim 13, the Examiner states that the recitation "a pair" of conductive elements is new matter. Claims 13-7 also have been rejected under 35 U.S.C. § 112, second paragraph, as vague and indefinite.

Further, claims 13, 16, 17, 30-33 and 36 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Braun et al. International Publication No. WO 99/04440 ("Braun").

The Examiner finds patentable subject matter in claims 34 and 35, and states that these claims would be allowed if rewritten in suitable independent form.

Summary of Applicants' Reply.

Applicants appreciate the Examiner's finding of allowable subject matter in claims 34 and 35.

Applicants have amended claim 13. No new matter is added.

Applicants respectfully traverse the § 112 rejections and the prior art rejections.

§ 112 rejections

With respect to claim 13, applicants note that the objected-to term "a pair" is not new matter. (See e.g., FIGS. 2, 3a, 3b and 3c and related description in the specification). When read in context, the term "a pair" in claim 13 refers to the first and the second of the three conductive segments in the claimed transitor (e.g., FIG. 2 segments 204a and 204b). Applicants do not believe that any clarifying amendment is necessary. However to avoid the

possibility of any semantic confusion and for consistency, applicants have amended claim 13 to recite "a first and a second [and a third] of said three conductive segments."

With further reference to claim 13, the terms "P-bridges" and "H-bonds," are common abbreviations in the art, which as the Examiner correctly approximates or conjectures, refer to phosphorus linkages and hydrogen bonds, respectively. However, no approximation or conjecture is necessary. Applicants note that the specification explicitly abbreviates phosphorus bridges as "P-bridges" and hydrogen bonds as "H-bonds." (See e.g., page 2 lines 8-12). Thus, applicants do not believe that any clarifying amendment is necessary. However to avoid any possibility of confusion, as suggested by the Examiner, applicants have further amended claim 13 to explicitly define abbreviations for "phosphorus bridges" and "hydrogen bonds" as "P-bridges" and "H-bonds," respectively.

Applicants respectfully submit that pending claims 13-17 and 30-36 are clear, definite, adequately supported by the written specification, and conform to all requirements of § 112.

§ 102 rejection.

Claims 13, 16, 17, 30-33 and 36 have been rejected as anticipated by Braun. Applicants respectfully traverse.

Independent claims 13 and 30

Applicants note that transitor action in a conventional semiconductor transitor (e.g., silicon field effect transistor) is obtained by activating, switching or modulating the electronic properties of the silicon material "active" core. A gate voltage, which is applied to the silicon material active core, changes the active core's conductivity and leads to "transitor" action i.e. increase or decrease in the current flowing through the active core between source and drain terminals.

Applicants' invention uses a length of DNA material as the "active" material or core of a transistor instead of conventional semiconductor materials. For example, claim 13 recites "wherein the active core comprises a fourth DNA segment." Transistor functionality is obtained by activating, switching or modulating the electronic properties of the length of DNA material itself. (See e.g., specification page 7). Claim 13, for example, includes the recitation that the "third segment is configured to electrically modulate current flowing across said [DNA material] active core." Claim 30 similarly recites, "electric charge in the length of the DNA molecule can be controlled by application of a voltage or current to the [capacitively coupled] gate structure."

As previously submitted, Braun does not show, teach or suggest using a length of a DNA molecule as the "active core" of a transistor (claim 13) or a gated electronic device (claim 30).

Braun only describes using DNA molecules, chains or fibers to form a template or support structure to shape other electronic materials making a micro-electronic device. (See Braun, Summary of Invention , page 3). Braun's DNA material, which is used as scaffolding, is removed after device formation. (See e.g., Braun page 18 lines 10-15). Braun does not show, teach or suggest use of the DNA material itself as the "active" electronic device material.

The Examiner cites Braun (i.e., Fig 6, page 30 line 9 - page 31 line 5, page 16 lines 4-10, and page 5 lines 5-9) as somehow disclosing "an active DNA core" transistor. (See Office Action, pages 3 and 4). Applicants respectfully disagree. The cited portions of Braun only describe use of nucleotide chains or fibers as a lithographically template or mold to make electronic device networks, but do not describe or suggest any use of electronically active DNA material in a transistor or device. The "active portions" in Braun's electronic networks are all

made of non-DNA material. (See e.g., page 16 lines 11-21: "non-nucleic acid fiber (e.g., conducting polymer or being a carbon nano-tube)," and page 16 lines 23-25: "conducting or semi-conducting polymer or co-polymer or conducting nano-tube"). Applicants also note that cited portion of Braun at page 30 line 9 - page 31 line 5, which relates to Fig. 6, describes a "colloid" particle 600 as forming "the active core" of a single electron transistor (SET). In Braun's construction of the SET, three oligonucleotides 601, 604, and 606 are attached to particle 600, which is first coated with an insulating barrier. Oligonucleotides 601, 604, and 606 act as lithographic templates or molding forms that are then coated with metal to convert them into metal wires 622, 624 and 626. Applicants note in particular that Braun's colloidal particle 600 is a gold particle that is covered with an alkaline thiol insulating gate layer (analogous to a silicon dioxide gate layer in s conventional silicon-based transitor). (See e.g., Braun, Fig. 6, and Example 14 pages 51 - 52). One of the three metal wires (e.g., wire 622) that is designated to serve as a gate conductor is placed in a high resistance conatact 608 with particle 600. Braun's SET exploits conventional coulomb blockage effect at the high resistance contact 608 to obtain transitor action in the gold particle 600. (See e.g., Braun page 31 lines 2-9, and the background description of the coulomb blockage effect in applicants' specification at page 8 lines 4-11).

Clearly, Braun does not show, teach or suggest an "active DNA core" transitor or the means of making electrically useful source, drain and gate contacts (i.e. P-bridges and H-bonds) to such an active DNA core.

For at least the foregoing reasons, claims 13 and 30 are patentable over Braun. Further, dependent claims 14-17, 31-33, and 36 are patentable for at least the same reasons.

Conclusion

This application is now in condition for allowance. Reconsideration and prompt allowance of which are requested. If there are any remaining issues to be resolved, applicants respectfully request the Examiner to kindly contact the undersigned attorney by telephone for an interview.

Respectfully submitted,

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